## *PROBLEMS.*

289. (*Selected*) *By Prof. M. L. Comstock.*—In any spherical triangle, show that $$\tan c = \frac{\cot A \cot a + \cot B \cot b}{\cot a \cot b - \cos A \cos B}.$$

290. *By Geo. Lilley, A. M., Corning, Iowa.*—Integrate

$$dy = \frac{dx}{n\varepsilon^x - 2(2x+1)},$$

where $\varepsilon$ is the Napierian base and $n$ a constant.

291. *By Prof. W. W. Johnson.*—If $ABC$, $A'B'C'$ are two trirectangular triangles on the surface of a sphere (the letters being arranged in the inverse order of rotation); show that

$$\cos AA' = \cos BB' \cos CC' - \cos B'C \cos BC'.$$

292. *By Chas. H. Kummell, U. S. Lake Survey, Detroit, Mich.* — Two surveyors measure a plane quadrangular field, one measuring the four sides $a$, $b$, $c$, $d$ with a chain and the other, the angles $(ab)$, $(bc)$, $(cd)$, $(da)$ with a theodolite. From former experience it is known that the first is liable to a probable error of $m$ inches per chain and the other to a probable error of $n''$ per angle. Required the weights of the linear and angular measurements, also conditions to be fulfilled by the measured quantities in appaoximate linear form and the analytical formation of the normal equatians for determining the most probable corrections to the measured quantities.

293. *By R. J. Adcock, Roseville, Ill.*—Assuming that the surface of the earth is an ellipsoidal level surface, whose principal diameters are $2a$, $2b$, $2b_1$, the force of gravity at their extremities, $p$, $q$, $r$; what then is the force of gravity at any other point whose latitude is $l$, and longitude, measured from the meridian of one extremity of $2a$, is $L$?

294. *By Alex. S. Christie, U. S. Coast Surv., Wash., D. C.*—One curve rolls upon another; prove that a series of carried parallel curves envelope a series of parallel curves, or, involutes of the same evolute envelope involutes of the same evolute.

295. *By Professor Hall.*—Given the common astronomical equations

$$\text{tang}\,(\lambda - \Omega) = \cos i \,\text{tang}\, u,$$
$$\sin \beta = \sin i \;\; \sin u,$$

eliminate $u$, and show in this manner that

$$\text{tang}\,\beta = \text{tang}\, i \sin (\lambda - \Omega).$$